SHORESIDE ELECTRIFICATION FEASIBILITY STUDY

May 17, 2005

California Environmental Protection Agency

Air Resources Board

Purpose of Today's Workshop

- Present Methodology of Feasibility Study
- Discuss Key Assumptions
- Receive Feedback

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Why Are We Conducting a Feasibility Study?

- Diesel Risk Reduction Plan (2000)
  - ➥ Reduce diesel PM 75% by 2010
  - ➥ Reduce diesel PM 85% by 2020
- ARB Commitment in South Coast SIP (2003)
- Governor's Environmental Action Plan (2004)
  - ➥ Reduce air pollutant emissions 50% by 2010

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Scope of Study

- Consider All California Ports (18) and Ocean-Going Vessel Visitors (2000+)
- Collect Data for Ships, Ports, and Electricity
- Narrow Potential Candidates for Shoreside Electrification
- Mention Alternative Strategies

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Data Sources

- Lands Commission Data for All California Ports
- Marine Exchange for Ports of LA & LB
- Data Submitted by Port of Oakland
- ARB's Ocean-Going Vessel Survey

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Data Sources (Cont.)

- Prior Cold-Ironing Projects and Studies
- Utility Tariff Schedules
- Web Search

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Criteria to Eliminate Ships & Ports

- Frequency of Visits to California (>5)
- Frequency of Visits to Specific Ports
- Frequency of Visits to Specific Berths
- Cost Effectiveness Considerations
  - ➟ Average Hotelling Hours
  - ➟ Hotelling Power Demand

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Assumptions in Cost Effectiveness Analysis

- Shoreside Infrastructure Cost - $3.5 million
- Shipside Cost - $1.5 million
- Project Life
  - ➟ Shoreside - 25 years
  - ➟ Shipside - 15 years
  - ➟ Capital recovery - 10 years
  - ➟ Real Interest Rate - 5%

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Assumptions in Cost Effectiveness Analysis (Cont.)

- Labor Costs
  - ➞ $100/hr per employee
  - ➞ 3 persons
  - ➞ Hook up and disconnect take 8-hour shift each
- Fuel Costs
  - ➞ Bunker fuel: $255/long ton
  - ➞ Marine gas oil: $410/long ton

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Assumptions in Cost Effectiveness Analysis (Cont.)

- Electricity Costs
  - ➞ Pacific Gas & Electric
  - ➞ Southern California Electric
  - ➞ LA Department of Water and Power
  - ➞ San Diego Gas & Electric

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Assumptions for Emissions Estimates

- Emission Factors
  - ➡ 75% residual/ 25% MGO
- Berthing Times
- Visits to California Ports
- Total kW of Auxiliary Engines
- Hotelling Load

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Cost-Effectiveness Thresholds Considered

- $13,600/ton Carl Moyer (NOx + ROG + PM10)
- South Coast AQMD Average Cost-Effectiveness Criteria
- Board-Adopted Diesel PM Air Toxics Control Measures

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Preliminary Ship Results

- Looks Promising
  - ➡ 333 container ships
  - ➡ 24 cruise ships
- Does Not Look Promising
  - ➡ 35 roros (vehicle carriers)

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Preliminary Ship Results (Cont.)

- Under Analysis
  - ➡ 72 tankers
  - ➡ 38 bulk ships
  - ➡ 13 reefers

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Ports Eliminated from Consideration

- Redwood City
- Humboldt
- Santa Barbara
- Sacramento
- Crockett
- Pittsburg
- Catalina

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Other Issues To Be Addressed

- Standardization of Electrical Hook-Ups
- Availability of Electricity

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Stakeholder Activities

- Port Visits
  - ➥ Port of Oakland
  - ➥ Port of Los Angeles
  - ➥ Port of Long Beach
  - ➥ USS/POSCO (Pittsburg)
- Pending Port Visit
  - ➥ Port of San Diego

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Stakeholder Activities (Cont.)

- Workshops
  - ➥ May 17, 2005 in Sacramento
  - ➥ June 2005 in Sacramento (tentative)

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Proposed Timetable

- Draft Feasibility Study - June (Tentative)
- Completed Study - End of July

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